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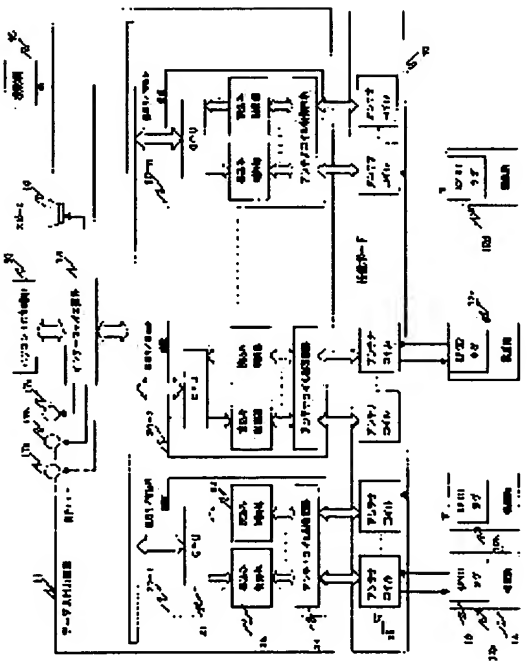
(54) THINKING SUPPORT SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To change video in real time by automatically reading classification data, position data, etc., immediately at the time of mounting a model frame on a mounting board to project the video on the mounting board by a projector.
SOLUTION: When a model frame 12 is placed on a mounting board 13 where a plurality of sectional mounting faces is formed, in a reader/writer 20 model frame data written in a transmission/reception storage part 15 in the model frame 12 are read by a read control part 23 through an antenna coil 25 in the counter position and position data are discriminated by an antenna coil control circuit 24. A personal computer 30 refers to an internal file on the basis of these data from the reader/writer 20 to form a composed picture to be projected by a projector 16. The formed composed picture is projected on the mounting board 13 through an interface circuit 18 by the projector 16. The personal computer 30 outputs data to be stored in a model frame, and a CPU 21 writes it in the transmission/reception storage part 15 of a desired model frame 12 through a write control part 22.



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CLAIMS

[Claim(s)]
[Claim 1] The model piece which has the transmission-and-reception storage section including the interface which sends and receives the storage section which memorizes model piece data including a model piece identifier and classification, the exterior, and data, and enables read and the writing of the data of this storage section, When loading of said model piece is detected by the detecting element of the loading board for being divided to two or more fields, having the detecting element which detects that said model piece was carried in each partition, respectively, and carrying said model piece, and said loading board, The data input output equipment which reads the model piece data which identified the location data of said model piece carried on said loading board, and were memorized by the transmission-and-reception storage section of said model piece, The model piece arrangement table which memorizes location data and model piece data from said data input output equipment, The image file which memorized image data corresponding to either of each data contained in location data and model piece data, or two or more data, It is based on each data contained in the location data and model piece data which were memorized by said model piece arrangement table. The processing section which searches said image file, creates the image about said model piece, compounds the created image with the image with which a background image or others was created, and creates a synthetic image, The thinking support system equipped with the projector which turns and projects the synthetic image outputted by said processing section on said projection board and/or said model piece.
[Claim 2] Said image file contains the classification / power image file which corresponded for every classification of said model piece, or other model piece data, and memorized image data. Said processing section According to the classification or other model piece data of said model piece which were memorized by said model piece arrangement table, the image for every classification or other model piece data is searched from said classification / power image file. The thinking support system according to claim 1 characterized by having the image creation section which creates the image which projects the searched image on the location of said model piece based on the location data of said model piece.
[Claim 3] 1 individual image file is included. the [said image file remembered the individual image data corresponding to the classification and area information on said model piece to be] -- said processing section When it corresponds to the area information memorized by 1 individual image file, corresponding individual image data is searched. the classification and location data of said model piece which were memorized by said model piece arrangement table -- being based -- the [said] -- The thinking support system according to claim 1 or 2 which carries out the description of having had the image creation section which creates the image which projects the searched image on the location of said model piece based on the location data of said model piece.
[Claim 4] Said data input output equipment is further equipped with the means for rewriting the data of transmission-and-reception storage circles of said model piece. Said image file 2 individual image file is included. the individual about the classification of a model piece, and change of a model piece -- something unusual -- the [which memorized the individual image data corresponding to an affair] -- said processing section When it corresponds to an affair, a corresponding individual image is searched. the time of said model piece being placed or moved -- the [said] -- the classification memorized with reference to 2 individual image file there, and an individual -- something unusual -- The image creation section which creates the image which projects the searched image on the location of a model piece based on the location data of said model piece, The thinking support system according to claim 1 to 3 characterized by having the read / write-in control section which memorizes the data which changed on said model piece arrangement table, and rewrites the transmission-

and-reception storage section of said model piece.
[Claim 5] Said data input output equipment is further equipped with the means for rewriting the data of transmission-and-reception storage circles of said model piece. Said image file 3 individual image file is included. the [which memorized the individual image data corresponding to the classification of a model piece, and relative conditions with other model pieces] -- said processing section When it corresponds to the classification and the relative conditions which were memorized there with reference to 3 individual image file, a corresponding individual image is searched. the time of said model piece being placed -- the [said] -- The image creation section which creates the image which projects the searched image on the location of a model piece based on the location data of said model piece, The thinking support system according to claim 1 to 4 characterized by having the read / write-in control section which updates said model piece arrangement table for the data which changed, and rewrites the transmission-and-reception storage section of said model piece.
[Claim 6] Said personal computer is a thinking support system according to claim 1 to 5 which said data input output equipment is further equipped with the voice output section which outputs voice data, and is characterized by said image file outputting the voice data which corresponds when the conditions of said image file are further fulfilled including the voice data corresponding to each conditions from said voice output section.
[Claim 7] The spot dynamic image from which movement will change if it becomes near or it moves in said loading board top and contacts said model piece is formed. It has further the movement image creation section for outputting a spot location. Said image file 4 individual image file is included. the [which memorized change of movement of a spot corresponding to the classification of said model piece] -- said movement image creation section If it judges that the spot location which projected the generated spot dynamic image on said loading board with said projector, and was outputted from said movement image creation section, and the location data of said model piece were in agreement, or approached the [said] -- the thinking support system according to claim 1 to 6 characterized by creating the spot dynamic image to which movement of a spot was changed according to the class of said model piece with reference to 4 individual image file.
[Claim 8] Said processing section is a thinking support system according to claim 1 to 7 which carries out the description of having had the image composition section which creates the synthetic image projected by compounding each memorized image data with reference to said synthetic image file including the synthetic image file which memorized the image data which corresponded to the identifier which shows said model piece identifier and background image, and was created by said processing section.
[Claim 9] Said processing section is a thinking support system according to claim 1 to 8 which carries out the description of having searched the background image from said background-image file, and having had the background-image creation section which creates the image projected on said loading board according to the identifier which shows the inputted background image including the background-image file said whose image file memorized image data corresponding to the identifier which shows a background image.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a thinking support system, and relates to the thinking support system which arranges a model piece on a loading board, carries out simulation of the circumference environment where it changes with arrangement of a model piece, and projected the image especially.
[0002]
[Description of the Prior Art] Conventionally, there is a system which considers the loading board which has the partition forming face divided in all directions as a thinking support system for study in two or more kinds of model pieces showing the environmental element of works, a tree, a house, etc. In this system, using two or more kinds of cards which described the data for environmental simulation, whenever the contents of description of these cards are inputted, a personal computer (henceforth a personal computer) makes environmental simulation the situation that the circumference environment changed, and is made to carry out a display output.
[0003] On the occasion of use of such a thinking support system for study, a card is lengthened in order in a game format, and according to the contents of description of the card, several persons' group arranges a piece on a board, and goes, for example. At this time, by inputting into a personal computer the contents indicated by the card, the class, and the total number of the piece placed on the board, the process in which an environment changes gradually and goes is projected on the display screen of a personal computer, and is learned.
[0004]
[Problem(s) to be Solved by the Invention] However, in the conventional thinking support system, in order to carry out alter operation of the arrangement situation of the piece on a board to a personal computer one by one manually, it is troublesome and takes time and effort. Moreover, the latency time until it projects on the display screen was required, study efficiency was bad, it was lacking in input dependability -- there is a possibility of carrying out incorrect alter operation further -- and development of the thinking support system with which quick and exact simulation study is obtained was desired.
[0005] Moreover, how to carry out string attachment management in the database of a personal computer conventionally was also considered. However, the code data length will become long, memory space will become large, and the classification information on a model piece will require time amount for read-out, if it is necessary to carry out unique coding and the number of pieces turns into a large number, in order to distinguish each. Furthermore, retrieval collating of a model piece needed to be performed and the personal computer side took time amount. Moreover, when the need of exchanging personal computers under some situations (failure etc.) occurred, since only classification information was memorized by the piece, it was difficult [it] to reproduce the condition of simulation.
[0006] Moreover, the conventional thinking support system was not equipped with the projector for projecting a background image or an individual image on a loading board. Therefore, a setup of a condition, an environment, and simulation and each situation remained for expressing on the display screen of a personal computer to the last (even if it passed through years in order that a season may change and environmental pollution occurred further). Furthermore, the model piece arranged on a loading board is still the design formed beforehand, and was not able to fulfill the versatility of corresponding or aligning which acquires a sense of togetherness with the image on a personal computer screen.
[0007] Moreover, conventionally, many coma has been arranged on a board to coincidence, and two or more

users are real time, and were not able to present the simulation result performed based on the arrangement on the board visually and in acoustic sense. Therefore, in the thinking support system used for study, a game, etc., it was difficult to raise a feeling of devotion, and presence.

[0008] In view of the above point, when this invention carries a model piece on a loading board, it reads classification data, location data, etc. automatically, and it aims at offering the thinking support system which can perform quick and exact simulation. This invention aims at offering the thinking support system which can update the status of a model piece (writing) with activation transition of simulation by giving ID information and not only classification information but various status information to a model piece (it being made to memorize), and building write-in equipment into a loading board side.

[0009] Moreover, this invention aims at changing the image on which it is projected on a loading board to real time with activation transition of simulation by installing a projector right above a loading board or in the upper part, and projecting an image on a loading board from the sky. And when two or more users use a projection function to the board which can arrange a coma, this invention adds a display function and aims at building the environment with which the location and the location which operates a model piece, and the location which presents the effect were therefore united.

[0010] Furthermore, in the environment where two or more users were projected, this invention is performing various simulation, such as a coordination activity, study, and a game, and aims at grasping the result of computer simulation very easily through the intuitive actuation of arrangement of a model piece.

[0011]

[Means for Solving the Problem] The storage section which memorizes model piece data including a model piece identifier and classification according to the solution means of this invention, The model piece which has the transmission-and-reception storage section including the interface which sends and receives the exterior and data and enables read and the writing of the data of this storage section, When loading of said model piece is detected by the detecting element of the loading board for being divided to two or more fields, having the detecting element which detects that said model piece was carried in each partition, respectively, and carrying said model piece, and said loading board, The data input output equipment which reads the model piece data which identified the location data of said model piece carried on said loading board, and were memorized by the transmission-and-reception storage section of said model piece, The model piece arrangement table which memorizes location data and model piece data from said data input output equipment, The image file which memorized image data corresponding to either of each data contained in location data and model piece data, or two or more data, It is based on each data contained in the location data and model piece data which were memorized by said model piece arrangement table. The processing section which searches said image file, creates the image about said model piece, compounds the created image with the image with which a background image or others was created, and creates a synthetic image, The thinking support system equipped with the projector which turns and projects the synthetic image outputted by said processing section on said projection board and/or said model piece is offered.

[0012]

[Embodiment of the Invention] The appearance block diagram of the thinking support system applied to this invention at drawing 1 is shown. This thinking support system is equipped with the model piece 12 (12a, 12b, 12c ...) of two or more [11 or] kinds of data input output equipment, the loading board 13, a personal computer (personal computer) 30, and a projector 16. One or more model pieces 12 may be used, and are good also as one class. The loading board 13 may be divided, combined and used for two or more boards also as one, and a configuration can also use the configuration of not only a rectangle but arbitration. Moreover, data input output equipment 11 can be equipped with the voice output section 19 grade by the visible display 17 (17a, 17b, 17c ...) with LED, LD, a lamp, etc., a loudspeaker, etc.

[0013] The model piece 12 has the model section showing an objective model appearance, and the transmission-and-reception storage section (a tag, RF-ID tag). The transmission-and-reception storage section includes the interface which sends and receives the storage section which memorizes model piece data including a model piece identifier, classification (and accepting the need the status, power, a reserve, other data), etc. of this model section, the exterior of loading board 13 grade, and data, and enables read and the writing of the data of this storage section. Transmission and reception of the data between the exterior of loading board 13 grade and the transmission-and-reception storage section of the model piece 12 can adopt

proper transmission means, such as wireless, a cable, light, and an electric wave. Two or more partition sides for the loading board 13 dividing every one model piece 12, and carrying out loading permission are formed. The loading board 13 and data input output equipment 11 are contained and equipped with a means to read the data memorized by the storage section of the model piece 12 interior carried on the loading board 13 corresponding to each partition, and the means which rewrites data (for details, it mentions later). A projector 16 projects an image on the loading board 13 based on data processing with a personal computer 30. A personal computer 30 incorporates data from a data entry unit 11, and performs data processing.

[0014] In the thinking support system of this invention, shortly after a user takes in his hand the model pieces 12a-12c of arbitration and carries in the partition loading side on the loading board 13, the model piece identifier memorized by the storage section of this carried model piece 12, classification data, etc. are read by the reader with which the loading board 13 and data input output equipment 11 were equipped. Moreover, the location data of the model piece 12 are detected from the reading station of this reader. Therefore, a user only places the model piece 12 on the loading board 13, and can acquire various data, such as ID data of the model piece 12, classification data, and location data, immediately. For this reason, the read data can be transmitted to devices, such as a personal computer, the display screen of an environmental variation which changes with the arrangement actuation whose user placed the model piece 12 can be projected in an instant, and simulation study reflected in arrangement actuation of a user can be performed quickly and correctly. Since it reads automatically and operates when the model piece 12 is especially carried on the loading board 13, the manual classification data of the model piece 12 and location entry-of-data actuation are omitted, the latency time for making it output to the display screen of a personal computer 30 is canceled, and study efficiency can be raised. Furthermore, a personal computer 30 utilizes data input output equipment 11 and a projector 16, to the loading board 13, presents visually on a board the result of the simulation from which two or more users are obtained coincidence or by arranging the model piece 12 one by one on real time, and updates, and is outputted also as voice. Moreover, since the image projected can be projected in accordance with a coma, the projection condition on the loading board 13 can also change.

[0015] Here, the block diagram of a model piece is shown in drawing 2 . The model pieces 12a-12c attach and form in one the both sides of the model section 14 showing the model appearance of bodies, such as a house and a tree, and the transmission-and-reception storage section 15 treated as a data carrier which memorizes the classification of this model section 14 possible [read-out] by the exterior to wireless, as shown in drawing 2 (A). In this case, anchoring with the model section 14 and the transmission-and-reception storage section 15 is faced. for example, insert the small transmission-and-reception storage section 15 in the lower location of model section 14a of a house, and build, or It is suitable to attach that what is necessary is to connect the transmission-and-reception storage section 15 with the base of wooden model section 14b, and just to unite with it, so that the transmission-and-reception storage section 15 may be located in the model section 14 bottom from the communication link configuration with the loading board 13 which counters the bottom.

[0016] Moreover, if the bottom has the complicated configuration like 14d of model sections of model section 14c of a car, or an animal when it is hard to attach the transmission-and-reception storage section 15 in drawing 2 (B) from a complicated model configuration so that it may be shown It is also possible to use together plinth 14e which built in the transmission-and-reception storage section 15, to unify above-mentioned model section 14c and plinth 14e of a car, to create the model piece 12, and to unify 14d of model sections of an animal and plinth 14e, and to create the model piece 12. Moreover, as shown in drawing 2 (C), a predetermined image may be projected on the location on which the model piece was put by the projector 16 using what combined plinth 14e which has plane of projection as a model piece 12, and the transmission-and-reception storage section 15. In addition, the object carried in a model piece can use the material (a part is exchangeable) in which combination is possible.

[0017] The block diagram about the control circuit of the thinking support system of this invention is shown in drawing 3 . This system is equipped with data input output equipment 11, the loading board 13, a personal computer (high order control unit) 30, a projector 16, and the model piece 12. Data input output equipment 11 is equipped with the voice output sections 19, such as the visible displays 17a-17c, such as an interface circuitry 18, read / write-in equipment 20-1 - 20-n, and Actuation LED, and a loudspeaker. The loading board 13 which carries the model piece 12 (12a-12d--) forms two or more partition loading sides of the shape of a grid sheet which divides for an abbreviation square in regular-intervals Rhine in every direction on the top face, and

carries out loading permission of every one model piece 12, contains antenna coil 25 in these partition loading sides and the internal location which counters, and is constituted.

[0018] Above-mentioned read / write-in equipment 20 (20-1 - 20-n) are equipped with the antenna coil control circuit 24, CPU21, the write-in control section 22, and the read control section 23. Read / write-in equipment 20 is read and a thing to write in about the various data memorized by the transmission-and-reception storage section 15 of the model piece 12 carried on the partition loading side. For every partition loading side of the loading board 13, two or more antenna coil 25 counters, and is arranged. The antenna coil control circuit 24 is collectively treated for every group of two or more antenna coil 25. As a group of antenna coil 25, 4x4=16 piece is set as 1 antenna coil group's reading object, and the total number of the antenna coil 25 arranged in all directions can carry out read actuation of these 16 pieces collectively. In addition, grouping may be carried out for every train or line. Between the antenna coil control circuit 24 and CPU21, it writes in and reads and the write-in control section 22 and the read control section 23 control various data, respectively. CPU21 performs transmission and reception of a personal computer 30 and various data through an internal bus and an interface circuitry 18. The voice output sections 14, such as the visible displays 17a-17c, such as Actuation LED, and a loudspeaker, are connected, and an interface circuitry 18 performs various visible and audible indications. Thus, while the magnitude of the arbitration corresponding to the magnitude of the loading board 13 is obtained by installing two or more read / write-in equipments 20, the number of communications areas of the request to which each antenna coil 25 corresponds is securable.

[0019] If the model piece 12 is placed on a partition loading side, ID, classification data, etc. which are written in the transmission-and-reception storage section 15 of the model piece 12 and one will be located in a communications area, and the antenna coil 25 of an opposite location will read and operate. The antenna coil control circuit 24 was interlocked with each antenna coil 25, and reads and grasps on real time whether the model pieces 12, such as what kind of identifier and classification, are arranged in which location of each partition where specific read / write-in equipment 20 were divided. In order to carry out independently the reading grasp of the arrangement situation of each model piece 12 by the write-in control section 22 or the read control section 23 of each read / write-in equipment 20 at this time, communication link connection is made through CPU21 and the interface circuitry 18 at the high order device of external personal computer 30 grade. On the other hand, a personal computer 30 transmits the address number of read / write-in equipment 20, and the arrangement situation of the model piece 12 in an instant. by receive the location data of the model piece 12 , the above-mentioned personal computer 30 can grasp the arrangement situation of the model piece 12 on [whole] the loading board 13 , perform environmental simulation software in response to the arrangement situation , and display the image result of the solid image which carried out the environmental variation on the output sections , such as CRT (drop) of a personal computer , as the address number for discernment of the reader send from an interface circuitry 18 . Moreover, on CRT, display guidance of the numeric parameter corresponding to each model piece 12 as an environmental variation element can also be carried out at coincidence at this time.

[0020] On the other hand, a personal computer 30 forms the image projected with a projector 16 based on the information memorized by the various information and the various files which were inputted. The formed image is projected on the loading board 13 by the projector 16 through an interface circuitry 18. Further, this image is projected also on each model piece 12, and can change the display of the model piece 12 suitably. Furthermore, a personal computer 30 outputs the data for memorizing in a model piece, and is located in CPU21 through an interface circuitry 18. Through the write-in control section 22, CPU21 controls the antenna coil control circuit 24 and antenna coil 25, and can write in the predetermined area of the transmission-and-reception storage section 15 of the desired model piece 12.

[0021] Thus, since it is repeatedly transmitted to a personal computer 30 through an interface circuitry 18, the reading information from each read / write-in equipment 20 can grasp the arrangement situation of the model piece 12 on [whole] the loading board 13, and its change in an instant. For this reason, for example, the activation result of environmental simulation software will change to real time every moment, and can perform simulation study of quick and exact town planning.

[0022] The detail block diagram of a personal computer (high order control unit) is shown in drawing 4 . A personal computer 30 is equipped with the processing section 100, the I/O section 200, an interface 300, an image file 400, the model piece arrangement table 500, and the synthetic image file 600. The processing section

100 is based on the image creation section 120 for searching and creating the background-image creation section 110 for creating a background image, and the various images to project based on an image file 400, and the synthetic composition image file 600. It is related with the image composition section 130 which creates the synthetic image for projecting by carrying out two or more various images and background images which were created, the transmission-and-reception storage section 15 of the model piece 12, the model piece arrangement table 500, the synthetic image file 600, and image file 400 grade. It has the movement image creation section 150 for generating the image which exercises [dynamic image / read and the read write control section 140 for writing in, / spot] each data. The I/O section 200 has an input device for performing a proper setup, a data input, etc., and a display and the output unit to the exterior. An interface 300 performs an interface with data input output equipment 11. the [according / an image file 400 / to the background-image file 410, the classification / power image file 420, and a location] -- the [by change of the 1 individual image file 430 and a model piece] -- the [by the 2 individual image file 440 and relative conditions] -- it has the 3 individual image file 450.

[0023] Below, an example of the file block diagram of the data memorized by drawing 5 at the transmission-and-reception storage section (storage section) of a model piece is shown. This data includes the model piece identifier (ID) 101, classification 102, power 103, and the reserve area 104. The number or sign to which the model piece identifier (ID) 101 was set every model piece 12 beforehand is memorized. Read-only **** can carry out the model piece ID 101 to the other classification 102, power 103, and reserve area 104 grade being rewritable suitably with the value fixed beforehand. The classification 102 is as follows.

- In the case of games, such as chess, shogi, and the game of go, "king" - "the Queen", etc. "step", and "golden" - "the king" etc. and "Kuroishi" - "Shiroishi", etc. are memorized.
- In the case of games, such as hockey and soccer, "keeper" -"offense" - "a defense" etc. is memorized.
- In the case of environmental problem simulation etc., the information about buildings and natural environment, such as "house" and "building" -"works" -"Thurs.", is memorized.

[0024] If power 103 is the value and works which are equivalent to height if it is a value, a building, etc. equivalent to physical strength or capacity for example, in a sport game, the value equivalent to exhaust gas, an excretory substance, etc. will be memorized. The reserve area 104 can define beforehand the value needed in each simulation in addition to this. moreover, count of a performance index for an environmental problem to become good in each simulation based on each simulation model, as for a personal computer 30 -- carrying out -- a count result -- visualization -- or it is made audible and you may make it display on the screen of a personal computer 30 A count result is memorized by the proper storage section with a personal computer 30, on the other hand, is read and is displayed by the display.

[0025] For example, based on the following performance indices, a personal computer 30 can also visualize a count result by change of the die length of a bar, or a color. To the classification of the model piece 12, in the "works" which increases an environment and nature, the "tree" which increases population sets [a "house"] the element which increases each bar to each of the model pieces 12 so that development and industry may be referred to as increasing. And when one of the model pieces 12 is placed corresponding to a pattern division of the loading board 13, by what kind of model piece 12 is in surroundings 8 mass, a count result is searched for and the bar displayed changes. When putting the model piece 12 of an example "a house" on the location where one perimeter of "works" three and a "tree" exists, each point corresponding to (the development +3 environmental-2 population -2) changes.

house = The number of population +250 change = development +30 Environment -20 Population -20 count result = development +30 Environment -20 population +230 -- based on this count result, each bar of development, an environment, and population changes. At a present stage, an image changes to five steps to one model piece 12. Also in which simulation program, if the model piece 12 is placed on a board, the town on simulation will change, and the visualized screen will be updated and displayed.

[0026] The flow chart about actuation of a thinking support system is shown in drawing 6 . First, if a power source is turned on (S201), an early background screen will be displayed on the loading board 13 by the projector 16 (S203).

[0027] The explanatory view of the background-image file 410 is shown in drawing 7 . As for this file, the simulation classification 301, a static image ID 302, a dynamic image ID 303, and voice ID 304 are contained. In addition, you may make it prepare only the image of one of requests suitably, and voice ID 304 may be

omitted.
[0028] Moreover, the explanatory view of each image file is shown in drawing 8 . In the static-image file 312, the dynamic-image file 313, and the voice file 314, the static-image data 305, the dynamic-image data 306, and voice data 307 are memorized corresponding to a static image ID 302, a dynamic image ID 303, and voice ID 304, respectively.
[0029] If the simulation classification 301 is inputted into a flow chart from return and the I/O section 200, the background-image creation section 110 will search a basic background image from the background-image file 410 according to the simulation classification 301. According to the searched static image ID 302, a dynamic image ID 303, or voice ID 304, the static-image file 312, the dynamic-image file 313, and the voice file 314 are referred to, each image is chosen suitably, and it memorizes with the identifier which shows a background to the synthetic image file 600. one or more the image composition section 130 was remembered to be by the synthetic image file 600 -- an image is compounded and a synthetic image is projected on the loading board 13 by the projector 16.
[0030] The explanatory view of the synthetic image file 600 is shown in drawing 9 . Corresponding to the identifiers 650, such as the model piece ID and a background, the creation image 660 created by the image creation section 120 is memorized. In the image composition section 130, the synthetic image which compounds each entry and is projected with a projector 16 is created. Next, if the model piece 12 is placed (S205), through antenna coil 25, the antenna coil control circuit 24, and the read control section 23, the location data of the model piece 12 will be judged by CPU21, and data will be read in the transmission-and-reception storage section 15 of the model piece 12 (S207). The model piece data of the judged location and the read model piece D101, classification 102, power 103, and reserve area 104 grade are transmitted to a personal computer 30 through an interface circuitry 18 by CPU21. In a personal computer 30, what was newly placed with reference to the model piece arrangement table 500 from that of the read write control section 140, or the already placed thing is judged. In the case of a new model piece, an entry is created on the model piece arrangement table 500, and on the other hand, when an entry already exists, the entry corresponding to the model piece ID 501 of the model piece arrangement table 500 is updated (S209). In this case, since the new model piece A was placed, a new entry is added.
[0031] Here, the explanatory view of the model piece arrangement table 500 is shown in drawing 10 . The model piece arrangement table 500 contains the location (i, j) 505 of the model piece ID 501 and the model piece 12, classification 502, power 503, and reserve area 504 grade. This table is rewritable suitably if needed. For example, migration of a model piece rewrites a location 505. Moreover, power 503 will be rewritten if power changes according to time amount, a count of actuation, etc. which were put, for example on the loading board 13. Moreover, an entry will be eliminated if the model piece 12 is excepted from the loading board 13. If it returns to a flow chart, next, classification / power image file will be referred to based on the location data and model piece data of a model piece, and various images will be searched and created (S211).
[0032] The explanatory view of classification / power image file 410 is shown in drawing 11 . Corresponding to the classification or power 601 of the model piece 12, the image 602 for every classification for projecting towards the model piece 12 is memorized by classification / power image file 410. For example, the following image data is memorized according to the classification 502 or power 503 memorized in the model piece arrangement table 500. In addition, image data is memorized corresponding to a reserve 504, and you may make it search predetermined image data based on a reserve 504. Furthermore, image data is memorized corresponding to two or more data, and you may make it search.
- In the case of games, such as chess, shogi, and the game of go, the image corresponding to "king" - "the Queen", etc. "step", and "golden" - "the king" etc. and "Kuroishi" - "Shiroishi", etc. is memorized.
- In the case of games, such as hockey and soccer, the image corresponding to "keeper" -"offense" - "a defense" etc. is memorized.
- In the case of environmental problem simulation etc., a building and the image about natural environment are memorized corresponding to classification 502 "house" and "building" -"works" -"Thurs." memorized in the position-memory table 500.
[0033] With reference to classification / power image table 410, the image creation section 120 searches the 1st image corresponding to the model piece A based on classification, power, or both, creates the image which projects that its location near the location according to the location of the model piece A, and memorizes this 1st

created image with the model piece ID to the synthetic image file 600 (S211). Other images, such as the 1st image memorized by the synthetic image file 600 and a background image, are compounded by the image composition section 130, a synthetic image is created, and it is projected on the loading board 13 by the projector 16 (S213).

[0034] The case where the model piece B is placed further is explained below. If the model piece B is arranged on the loading board 13 (S205), through antenna coil 25, the antenna coil control circuit 24, and the read control section 23, the location data of the model piece 12 will be judged by CPU21, and data will be read in the transmission-and-reception storage section 15 of the model piece 12 (S207). The model piece ID 101 location [the piece] and read and classification 102 which were judged, power 103, and the reserve area 104 are transmitted to a personal computer 30 through an interface circuitry 18. Furthermore, in a personal computer 30, what was newly placed, or the already placed thing is judged with reference to the model piece arrangement table 500 like an above-mentioned flow chart. In the case of a new model piece, an entry is created on the model piece arrangement table 500, and on the other hand, when an entry already exists, the entry corresponding to the model piece ID 501 of the model piece arrangement table 500 is updated. In this case, since it is the new model piece B, like an above-mentioned flow chart, a new entry is added (S209), and the 2nd image corresponding to the model piece B is searched and created (S211). This 2nd image is compounded by the synthetic image section 130 with other images, such as a background image and the 1st image, and is projected on the loading board 13 by the projector 16 (S213). It repeats until simulation ends the above processing (S215).

[0035] Below, various modes of processing of step S211 by the image creation section 130 are explained. In the image creation section 130, it is possible to perform each two or more processings to juxtaposition suitably. Two or more images created at that time are memorized by the synthetic image file 600, the file is referred to by the image creation section 130, each image is compounded and the synthetic image projected is projected on the loading board 13 by the projector 16. First, image creation processing in which an image is changed according to the location of a model piece is explained.

[0036] the [according to a location to drawing 12] -- the explanatory view of the 1 individual image file 430 is shown. the -- in 1 individual file 430, classification 701, the area information 702, and the individual image 703 are included. the [the location 505 where the image creation section 120 of a personal computer 30 was memorized in the model piece arrangement table 500, and] -- when the area information 702 in the 1 individual image file 430 is compared and a certain model piece 12 is in predetermined area, the corresponding individual image 703 is searched and the image for creating the image for projecting it according to location data is created. The image creation section 130 is based on the created image, and a synthetic image is created, and it is memorized and projected. In addition, what is necessary is just to memorize the information which becomes common to classification 701, in order to project the individual image 703, when it is in predetermined area about all classification.

[0037] Below, image creation processing in which an image is changed according to change of a model piece is explained. The flowchart of the image creation processing by condition judging is shown in drawing 13 . the [moreover, / according to change of a model piece to drawing 14] -- the explanatory view of the 2 individual images table 440 is shown. the -- the 2 individual images table 440 -- classification / power 801, and an individual -- something unusual -- an affair 802 and the individual image 803 are included. In addition, corresponding to the individual image 803, the voice file 804 may be added if needed. the individual by change of a model piece -- something unusual -- as an affair 802, when it enters from the outside of the area in predetermined area and power is reduced by time amount progress (when a "step" grows into "gold" etc.), it is the case where two or more model pieces serve as contiguity or the same location etc., for example. In the case where it enters from the outside of the area in predetermined area (when a "step" grows into "gold" etc.) For example, the image creation section 120 of a personal computer 30 If it judges that the model piece 12 has change of migration, removal, etc. based on the model piece ID 501, the classification 502, and the location 505 which were memorized in the model piece arrangement table 500, a certain model piece 12 will judge whether the predetermined individual conditions 802 are fulfilled (S301). When fulfilling individual conditions, the image creation section 120 searches the corresponding individual image 803, and creates an image in a predetermined location (S302). Furthermore, the movement image creation section 150 rewrites the predetermined data of classification 502, power 503, and reserve 504 grade according to change of the

classification of the model piece 12 about the corresponding model piece ID 501 which was memorized by the model piece arrangement table 500, when fulfilling individual conditions (S303). Furthermore, the movement image creation section 150 of a personal computer 30 transmits the data to read / write-in equipment 20 through an interface 23, and read / write-in equipment 20 rewrites the data of the transmission-and-reception storage section 15 in the model piece 12 through the write-in control-section 22 antenna-coil control circuit 24 and antenna coil 25.

[0038] Moreover, when power is fluctuated by time amount progress about power, in case two or more model pieces serve as contiguity or the same location, the case where power changes etc. can also be processed as follows. Namely, as individual conditions 802, define beforehand the power increase and decrease by contiguity in fixed time amount progress, and other model pieces and a background image, or contact, and they are memorized. When it corresponds to this individual condition 802 (S301), a predetermined image can be generated near the model piece (S302), and the power 503 and 103 of the transmission-and-reception storage section 15 in the model piece arrangement table 500 and the model piece 12 can be rewritten (S303).

[0039] Below, image creation processing in which an image is changed according to the relative conditions of two or more model pieces is explained. The flow chart of the image creation processing by the relative conditions of a model piece is shown in drawing 15 . the [moreover, / according to the relative conditions of a model piece to drawing 16] -- the explanatory view of the 3 individual images table 450 is shown. the -- on the 3 individual images table 450, the individual image 902 of distance 901, a dynamic image, or a static picture image, the individual voice 903, and the rewriting existence information 904 are included. When a certain model piece has been arranged, the image creation section 120 of a personal computer 30 compares the location 502 of other model pieces already remembered to be the locations of the model piece memorized in the model piece arrangement table 500, and calculates the distance between model pieces (S401). if the image creation section 120 is less than a predetermined value -- the nearest distance -- being based -- the -- with reference to the 3 individual images table 450, the image data 902 corresponding to distance 901 and voice data 903 are searched, and an image is created (S405). The image composition section 130 is memorized in the transmission-and-reception storage section 15 of the model piece arrangement table 500 and the model piece 12 while it compounds the created image with other images and projects it with a projector 16. At this time, the individual voice 903 can also be outputted in the voice output section 19.

[0040] Distance a zero or direct ****** case (distance 901 is 0 or 1) furthermore, the image creation section 120 The rewriting existence information 904 on the 3 individual images table 800 is referred to. the -- Simulation or setups of a game (for example, the power of both the model piece is compared or) Actuation of which model piece moved to the location of the model piece of another side later based on location data is analyzed, and it may fluctuate, for example or you may make it rewrite the entry of the model piece arrangement table 500 of a model piece, and the power of the transmission-and-reception storage section 15 to zero. In addition, when power becomes zero, the image in which what should be removed from a loading board is shown can also be projected.

[0041] Below, a flow chart in case a model piece is removed by drawing 17 is shown. This is performed in parallel to processing of steps S205-S213. When a model piece is removed (S601), antenna coil 25 detects the change, CPU21 grasps through the antenna coil control circuit 24 and the read control section 23, and CPU21 transmits the location to a personal computer 30 through an interface 23 (S603). A personal computer 30 eliminates the applicable entry of the model piece arrangement table 500, when the model piece ID 501 is specified and it is not again placed fixed time from a location 505 with reference to the model piece arrangement table 500 (S605) (S607). Next, according to the model piece ID, an individual image is eliminated from the synthetic image file 600 (S609). Next, supplementary information is carried out about application. The thinking support system of this invention is applicable to the following systems.

[0042] (1) Explain the simulation which a model piece serves as a player and performs a game to the game which operates the body which is projected on a board and moves with two or more users through a coma, and the following like the game of hockey, soccer, ping-pong, and tennis when spot dynamic images, such as a pack and a ball, exercise a loading board top. For example, the game which performs hockey on a board is explained. By the projector 16, the pack which moves is projected on the loading board 13. The player surrounding the loading board 13 rebounds the pack which goes to its place by putting a coma on a board (point of block ****). A pack cannot be rebounded well, but it will become defeat if the wall of its position is collided with.

[0043] The flow chart of the image creation processing to a spot dynamic image is shown in drawing 18 . If the movement image creation section 150 for generating a spot dynamic image serves as near or it moves in a loading board top and contacts a model piece, it will form the spot dynamic image which reflects or changes, and will output a spot location. An image file 400 corresponds and memorizes change processing of a spot by classification of a model piece as classification / a power image file 420. For example, according to classification, or it carries out the model piece which only rebounds a pack or a ball, and a rate early, the model piece made late, the model piece which makes a travelling direction reverse, the model piece which skips the next partner, the model piece which makes its position small are mentioned.
[0044] A personal computer 30 projects the spot dynamic image generated by the movement image creation section 150 on the loading board 13 with a projector 16 (S701). If the movement image creation section 150 judges that the spot location and the location data of the model piece 12 which were outputted were in agreement, or approached (S703), it will change movement of a spot with reference to classification / power image file 420 according to the class of model piece 12 (S705). The movement image creation section 150 creates a still newer spot dynamic image (S707). In addition, the synthetic image file 600 is made to memorize a spot dynamic image with an identifier.
[0045] (2) By arranging a coma in the suitable location shown through an image, two or more musical instruments (**** etc.) are projected on the study support system 13 by creating music, for example, a loading board. The background-image file 410 which matched and memorized this location and class of musical instrument by which **** projection was carried out is needed. a sound -- the sound data corresponding to a location were memorized by doubling comfortably and putting the model piece 12 on the location (for example, sound of "DO" of ****) specified by an image -- a sound can be sounded if file correction is made. If it carries out by surrounding the loading board 13 by two or more persons by the model piece 12, it will become possible to learn a cooperative performance and the feeling of a sound.
[0046] (3) Using a coma, a town is built on the loading board 13, and in the urban environment study support system by projecting change of that environment visually, and this case, a user can project on the loading board 13 the environmental variation situation of changing in an instant, with the arrangement actuation which placed the model piece 12, and can perform simulation study of the efficient town planning reflected in arrangement actuation of a user to CRT25 of a personal computer.
[0047] Moreover, for example, arranging the model pieces 12, such as works and a residence, around the loading board 13, on an assembly and the loading board 13, a student lives for himself and makes a good town together. The interface circuitry 18 of the model piece 12 reads arrangement of the model piece 12, makes the software and the loading board 13 which perform environmental simulation cooperate, and a personal computer 30 expresses an environmental change visually using animation etc. with a projector 16, and it projects it on the loading board 13.
[0048] Furthermore, town planning can be advanced, arguing mutually, considering an environmental problem and cooperating by placing the model piece 12, by setup of an image file 400, by the thing to depend on a projector 16 and for which visual and the acoustic-sense-feedback by the loudspeaker 19 are given to a student, as it is experiencing itself.
[0049] Moreover, using the thinking support system of this invention two or more sets, each can be connected through a network and data can also be exchanged mutually. What is necessary is to connect with various networks, such as the Internet, a telephone network, and a mobile network, from each personal computer 30 of each thinking support system in this case, to send and receive either or two or more data of the model piece arrangement table 500, the synthetic image file 600, and image file 400 grade mutually, and just to memorize them. Thus, when creating as an example in the location which left two or more towns with each thinking support system, based on the received various data, the situation of other towns can be changed to the image of a self-system on the loading board 13 with the projector 16 of a self-system, and can be projected.
[0050] (4) Atmospheric air will be polluted, if it is made to concentrate not much and the environmental pollution area 12, for example, the model piece of works, is placed on the loading board 13. Then, a personal computer 30 can be shown by projecting a gray image for signs that air becomes dirty whenever it places the model piece 12 of works with a projector 16, on the loading board 13. In this case, classification prepares the classification / power image file 410 which memorized the image which expressed centering on model piece which showed scale extent by power at works predetermined within the limits as an environmental pollution

area, and should just perform image creation.
[0051] Moreover, an environment and background situations, such as flow of a river and a sea wave, can be projected as an animation or a still picture as a natural image with a projector 16 by forming the background-image file 410 suitably, and it can express on the loading board 13. In addition to it, the environment and background change of change/destruction of natural environment, aging of a building, etc. by a change of a season and progress of years are reproducible with reality on the loading board 13 as a result of simulation. For example, an expression which withers a tree in spot can also do only an environmental pollution area.
[0052] (5) With the thinking support system of this invention, by carrying out [sound] data addition to an image file, the image displayed on the loading board 13 by actuation of a coma on the loading board 13, and since voice can change if needed further, a user's attention is always turned to the loading board 13, and can raise a feeling of devotion to the point pan outputted also as voice. Moreover, a personal computer 30 can output the situation of the noise as voice by the loudspeaker 19, or can show it by projecting the character of human being who has closed the lug, and an animal.
[0053] In addition, although one above-mentioned example showed the example which detects location data based on the data existence of the radio between each antenna coil 25 and the transmission-and-reception storage section 15 on the occasion of detection of the location data of the model piece 12, it is good also as a configuration using a detecting element which installs a coordinate contact in each partition loading side 17 not only this but on the loading board 13, and acquires location data from these coordinate contacts. Moreover, electrostatic and the optical and proper detecting element for detecting can be used besides antenna coil 25.
[0054] In addition, in case a background image is projected on the loading board 13 whole, a superior team comes to be known for a background and background-image data which divide and project a screen may be used. Moreover, the image creation section 120 may add the processing which carries out void or black omission of the background image about the part of model piece 12 grade further. Moreover, although applied to study of the environmental simulation of town planning, such as a house, a tree, and works, in the one above-mentioned example, it is widely applicable to the simulation study at the time of disaster generating etc. using model pieces, such as a distribution condition of a living thing, a typhoon, a flood, an earthquake, and a fire, using the model piece of the living thing of the animal not only this but according to [various] area, a fish, and a bird.
[0055] In the thinking support system of this invention, when it is divided into two or more groups and performs simulation using a separate loading board, only a model piece may be exchanged among groups. That is, a model piece with the classification, the newest status, or newest power used into other groups can be used on its loading board. Moreover, status information can be reflected in coincidence also when rearranging a model piece on the same board within a group.
[0056]
[Effect of the Invention] According to this invention, as mentioned above, when a model piece is carried on a loading board, classification data, location data, etc. can be read automatically, and the thinking support system which can perform quick and exact simulation can be offered. According to this invention, the thinking support system which can update the status of a model piece (writing) can be offered with activation transition of simulation by giving ID information and not only classification information but various status information to a model piece (it being made to memorize), and building write-in equipment into a loading board side.
[0057] Moreover, according to this invention, the image on which it is projected on a loading board can be changed to real time with activation transition of simulation by installing a projector right above a loading board or in the upper part, and projecting an image on a loading board from the sky. And according to this invention, when two or more users use a projection function to the board which can arrange a coma, a display function can be added and the environment with which the location and the location which operates a model piece, and the location which presents the effect were therefore united can be built.
[0058] Furthermore, according to this invention, in the environment where two or more users were projected, the result of computer simulation can be grasped very easily through the intuitive actuation of arrangement of a model piece by performing various simulation, such as a coordination activity, study, and a game.

[Translation done.]

* NOTICES *

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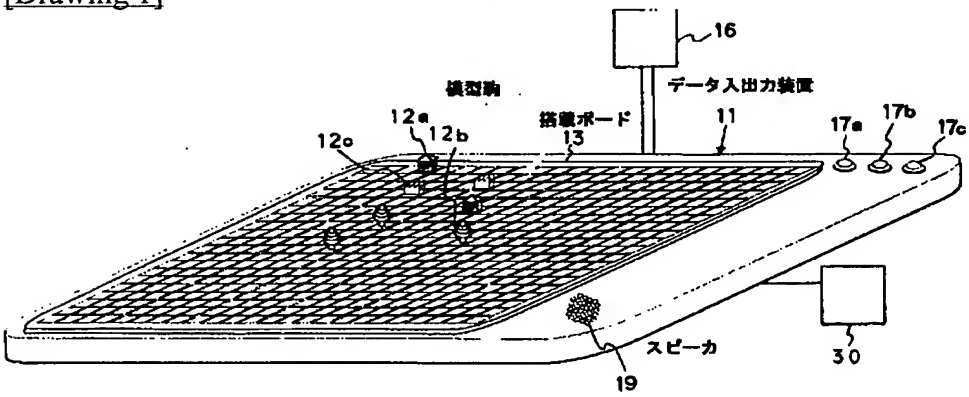
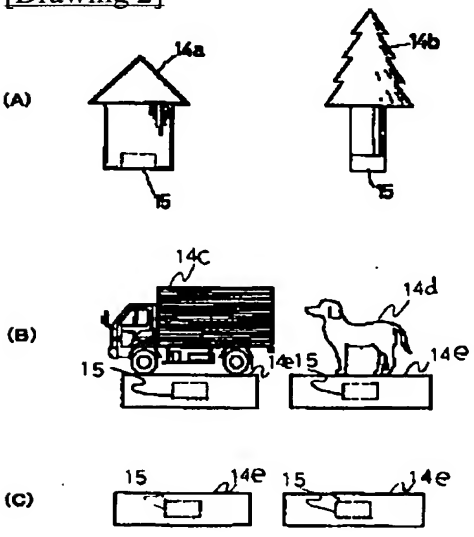
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

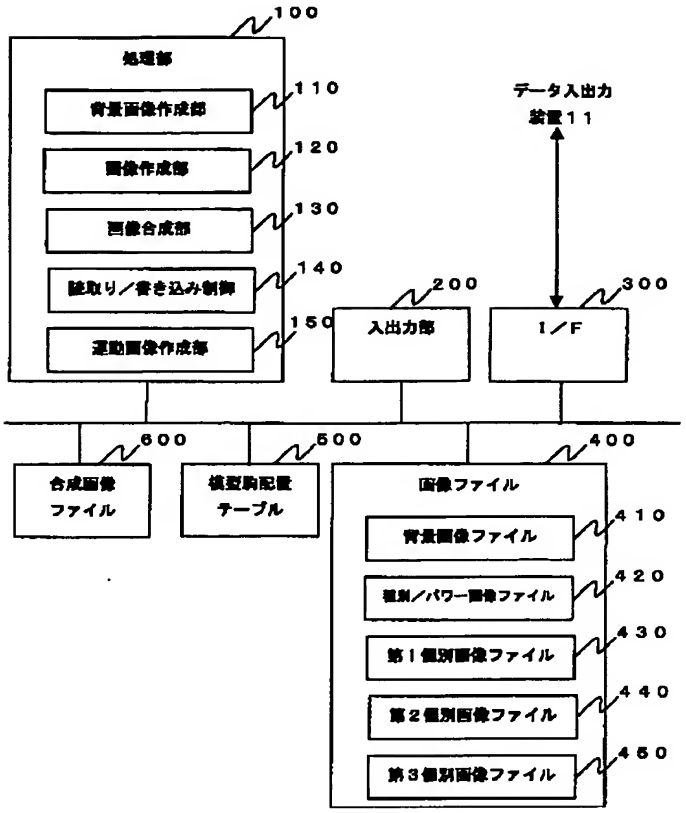
[Drawing 1]



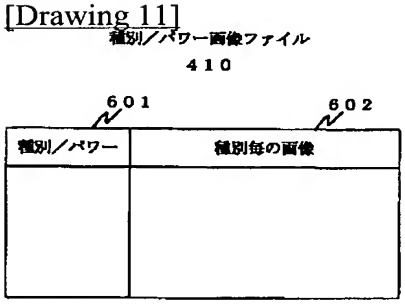
[Drawing 2]



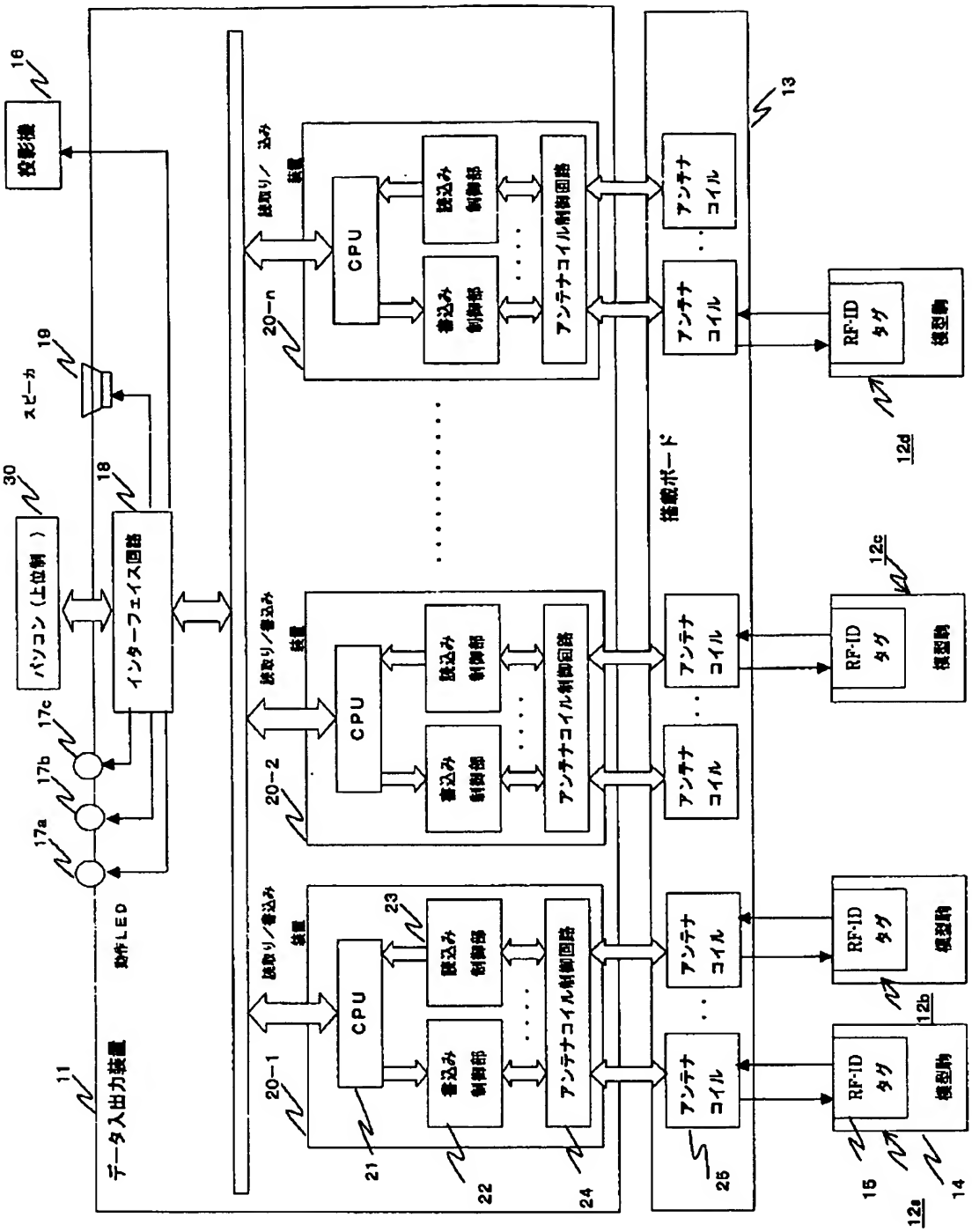
[Drawing 4]



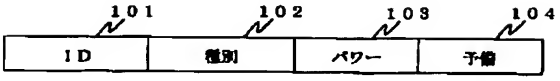
[Drawing 11]



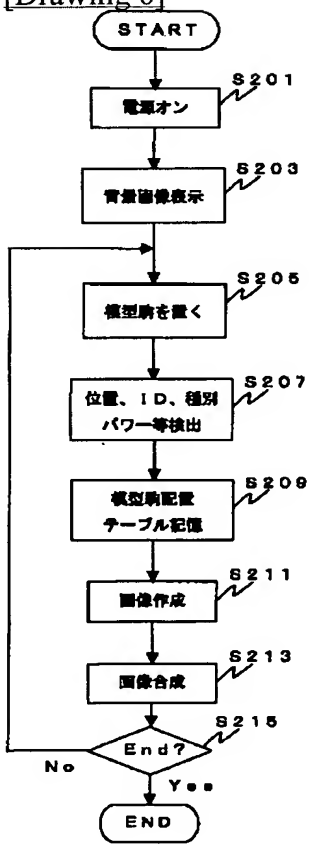
[Drawing 3]


投影機
16
スピーカ
19
パソコン（上位制 ）
30
インターフェイス回路
18
17c
17b
17a
動作LED
データ入出力装置
11
読取り／書込み 装置
CPU
20−n
20−2
20−1
21
書込み 制御部
23
22
アンテナコイル制御回路
24
アンテナ コイル
25
搭載ボード
13
RF-ID タグ
搭載物
12d
12c
12b
12a
15
14

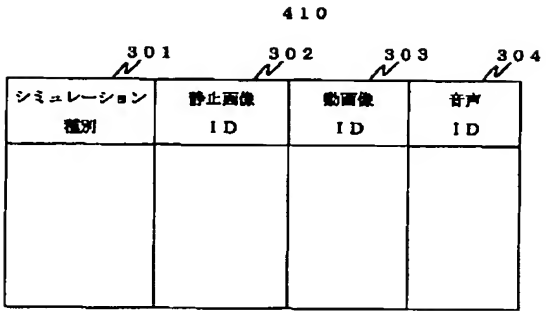
[Drawing 5]


101
102
103
104
ID
種別
パワー
予備

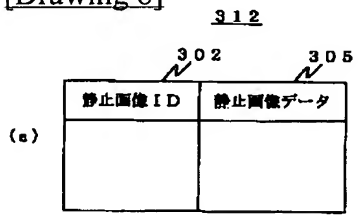
[Drawing 6]

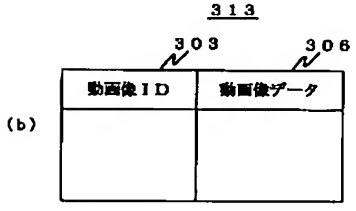

START
S201
電源オン
S203
背景画像表示
S205
模型時を置く
S207
位置、ID、種別
パワー等検出
S209
模型時配置
テーブル記憶
S211
画像作成
S213
画像合成
S215
End?
No
Yes
END

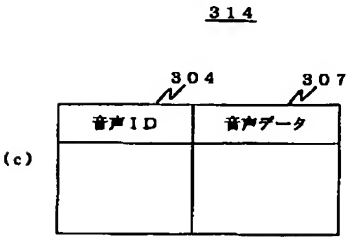
[Drawing 7]



[Drawing 8]







[Drawing 10]

模型駒配置テーブル
500

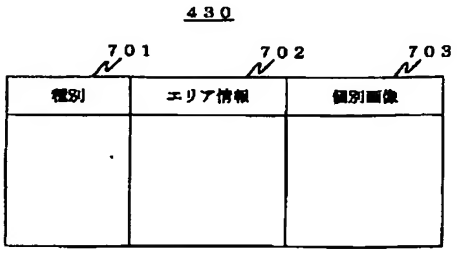
501 模型駒ID	505 位置 (i, j)	502 種別	503 パワー	504 予備

[Drawing 9]

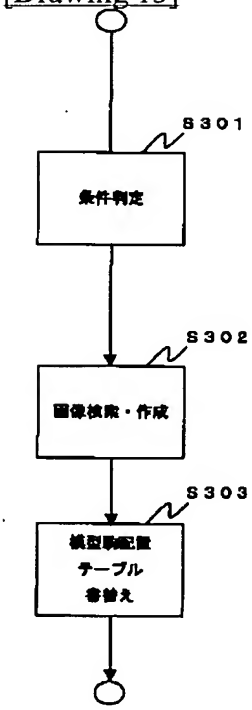
600

識別子	画像／音声
背景	画像／音声
ID1	画像
ID2	

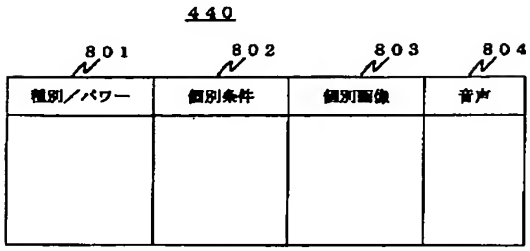
[Drawing 12]



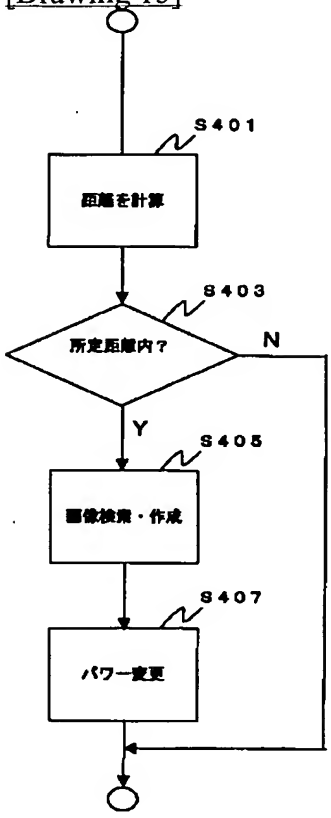
[Drawing 13]



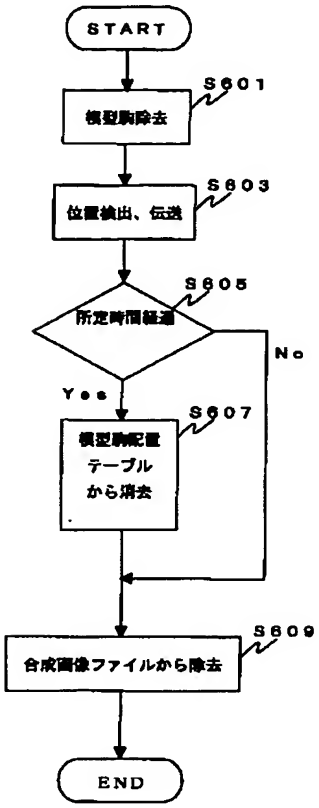
[Drawing 14]



[Drawing 15]



[Drawing 17]

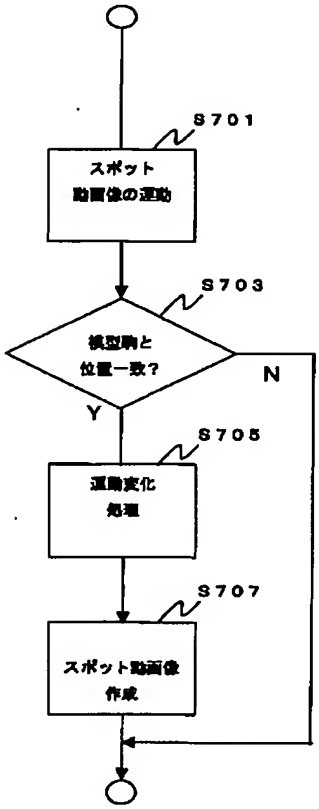


[Drawing 16]

450

901 距離	902 個別画像	903 個別音声	904 書替え有無
0	フラッシュ	警報音大	有
1	赤点滅	警報音中	有
2	赤	警報音小	無
3	黄	—	無
⋮	⋮	⋮	

[Drawing 18]



[Translation done.]